

IN THE SPECIFICATION

Please amend the paragraphs of the specification as follows:

On page 5, please replace paragraph [1021] with the following amended paragraph:

Between the lobes of an antenna beam pattern there exists a null, in which the signals transmitted through antennas 104 destructively interfere with each other. For example, in the antenna pattern 130, nulls exist between lobes 130A and 130B, between lobes 130B and 130C, and between 130C and 130A. In an exemplary embodiment, antenna beam pattern 130 is formed such that its primary lobe 130a is placed within or nearly within the null between lobes 132a and 132B of antenna beam pattern 132. Similarly, antenna beam pattern 132 is formed such that its primary lobe 132A is placed within or nearly within the null between lobes 130A and ~~[[130B]]~~ 130C of antenna beam pattern 130. Such careful arrangement of antenna beam patterns 130 and 132 reduces the degree to which the signals transmitted through each of the antenna beam patterns will destructively interfere with each other when received at subscriber station antenna 112.

On page 6, please replace paragraph [1025] with the following amended paragraph:

Advancing or retarding the data portions 202 of the frame may result in some overlap of the data with the MAC portions ~~[[104]]~~ 204 or the pilot burst portions 206 of the frame. Such overlap can cause substantial surges or spikes in the power required to transmit the composite signals. Such surges can overload a high power amplifier (HPA) in a transmitter or cause increased interference to signals in the coverage areas of neighboring base stations. Many approaches will be obvious to one of skill in the art for mitigating such surges. For example, a guard band can be placed between the data portions 202 and MAC portions 204 of the frame. The guard band would be wide enough to accommodate the largest probable difference in the lengths of the signal paths 106 and 108 (also called "multipath spread." For example, a guard band of three chips might be enough to accommodate the multipath spread of a typical wireless communication system. Another approach to mitigating transmit power surges would be to truncate or gate the MAC portions 204 as necessary to avoid overlap with the data portions 202

of the frame. Alternatively, the data portions 202 could be truncated or gated in order to avoid such overlap. In another example, the overlapping regions of the MAC portions 204 and the data portions 202 could be attenuated so that the power in the sum of the signals is approximately the same as in other portions of the frame.

On page 8, please replace paragraph [1030] with the following amended paragraph:

FIG. 4 shows a base station apparatus for transmitting the data portions 202 of each transmit frame. As shown, the data signal to be transmitted to the subscriber station 120 is spread using a PN code in a PN spreader 402. The resultant PN-spread data signal is then provided to L delay units 404, where L is the number of signal paths through which the data is to be transmitted, and each delay unit 404 is associated with a different transmit ~~[[beams]]~~ beam (such as 130 or 132) and transmit path (such as ~~[[130]]~~ 106 or ~~[[132]]~~ 108). Each delay unit 404 delays its corresponding input signal by a delay value τ corresponding to an assigned transmit signal path. The different values of τ_1 through τ_L are selected such that the signals transmitted through the various transmit beams (such as 130 and 132) and the various signal paths (such as 106 and 108) arrive at the antenna 112 of the subscriber 120 at the same time. In an exemplary embodiment, the delays for paths 2 through L are determined relative to the temporal position of the first path signal, such that the first delay 404A can be omitted.

On page 9, please replace paragraph [1031] with the following amended paragraph:

In the embodiment shown in FIG. 4, each delay 404 is associated with a different transmit beam and transmit path. In order to form a beam for the path associated with delay 404A, the output of the delay 404A must be adjusted for each of the M transmit antennas 104. The output of delay 404A is provided to M weighting units 406. Each of the weighting units 406 applies a weight f that is specific to a single antenna 104 and the transmit beam or path corresponding to the delay 404A. Similarly, the output of delay 404L is provided to M weighting units 420. All M of the weighting units 420 are associated with the transmit beam or path corresponding to the delay 404L. Each of the weighting units 420 applies a weight f that is specific to a single antenna 104 and the transmit beam or path corresponding to the delay 404L. In FIG. 4, the subscripts of

the weights f indicate a corresponding path and antenna. For example, $f_{L,1}$ is the weight applied in weighting unit 406A and corresponds to path 1 and antenna 104A, $f_{L,M}$ is the weight applied in weighting unit 406M and corresponds to path 1 and antenna 104M. Weighting unit 420A applies weight $f_{L,1}$ corresponding to path L and antenna 104A, and weighting unit [[420A]] 420M applies weight $f_{L,M}$ corresponding to path L and antenna 104M.

On page 12, please replace paragraph [1038] with the following amended paragraph:

In an exemplary embodiment, subscriber station 120 includes an encoder (not shown) for encoding the channel estimate information, an interleaver (not shown) for interleaving the channel estimate information, a modulator (not shown) for modulating the channel estimate information, and a transmitter (not shown) for upconverting and amplifying data signals for transmission through a transmit antenna. The transmit antenna may be the same as the receive antenna 112 with the use of a diplexor (not shown). Thus, the channel estimate information is transmitted from the subscriber station 120 to the base station 102. The described apparatus used to prepare channel estimate information for transmission are not shown in the figures, but are well known in the art and capable of being implemented in a variety of ways.

On page 13, please replace paragraph [1041] with the following amended paragraph:

As shown, a similar set of elements are used to estimate the channels for each of M antennas 104 and for each of L transmit paths. For the Lth transmit path, the output of PN despreaders 604L is provided to a set of pilot de-cover mixers 630A through 630M and channel estimators 632A through 632M. For each transmit antenna 104, there is a corresponding pilot de-cover mixer 630A and channel estimator 632. For example, for antenna 104A, the corresponding pilot is de-covered using Walsh code W1 in pilot de-cover mixer 630A, and the resulting de-covered pilot signal is provided to channel estimator 632A. Channel estimator 632A generates an estimate of the channel from antenna 104A through the Lth transmit path. Where one of the Walsh codes (for example W1) is the all-ones Walsh code, one mixer can be omitted for each path (for example 620A and 630A).

On page 17, please replace paragraph [1049] with the following amended paragraph:

In an exemplary embodiment, PN spreaders 302 and 402 are complex PN spreaders, and ~~generates~~ generate complex outputs having real and imaginary components. In an exemplary embodiment, each transmitter 310 treats complex input signals as quaternary phase shift keying (QPSK) signals for purposes of upconversion and transmission. For example, the real components of an input signal would be upconverted as in-phase components by multiplication by a cosine carrier, and the imaginary components would be upconverted as quadrature-phase components by multiplication by a sine carrier. The resulting in-phase and quadrature-phase signals could then be summed in a summer before being amplified in an HPA and transmitted through an antenna 104.